Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2025
Course Code: SE 222; Course Title: Computer Architecture
Sections & Teachers: A to O (SR, FBR, AS, HKN)

Time: 1 Hour 30 Mins **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. a) A processor has base clock speed of 500 MHz. It is used to execute a benchmark program with the following instruction mix and clock cycle count. [Marks-4] CLO-1 *Level-2*

Instruction Type	CPI	No of instructions
Arithmetic	2	7000
Floating Point	3	5000
Data Transfer	4	3000
Control Transfer	5	2000

Compute the effective CPI and Execution Time for this program.

b) For Question 1(a) [Marks-4]
Option 1: Reduce CPI of Floating point type to 1.5
Option 2: Reduce CPI of data transfer type to 2
Estimate the better option in terms of MIPS rate.

c) **Clarify** the top level components of GP processor along with diagram. [Marks-4]

d) Suppose a program runs in 60 seconds on a machine with the instruction of A and B. Instruction A type is for 45 seconds of this time. [Marks-3]
Compute the improvement (%) of A type instruction if we want the program to run 3 times faster?

2. a) [Marks-4.5] CLO-2 *Level-4*

Memory	
300	1941
301	C942
302	2942
941	0004
942	0002

CPU Register	
300	PC
	AC
	IR

Here memory contents are represented in hexadecimal
0001---Load AC from Memory
1100---Subtract AC from Memory
0010---Store AC to Memory Location

Where A=10, B=11, C=12, D=13, E=14, F =15
Explain the execution steps of Hypothetical Processor for the given scenario.

b) **Compare** Instruction cycle without and with interrupt. [Marks-2.5]

c) **Differentiate** Register, Cache, and Main Memory based on their Performance, roles and working principles. [Marks-3]